International Journal of Advanced Science and Research
ISSN: 2455-4227
Impact Factor: RJIF 5.12
www.allsciencejournal.com
Volume 3; Issue 1; January 2018; Page No. 110-111

Study of cement dust retentivity of various plant

[*1] Dr. Prakash Dubey, [2] Jyoti Bhadauriya
[1] Department of Physics, Janta PG College Bakewar, Etawah, Uttar Pradesh, India
[2] Department of Chemistry, Janta PG College Bakewar, Etawah, Uttar Pradesh, India

Abstract
Cement dust retention capacity of leaves of different trees and plants has been investigated. The results indicate that Neem leaves have the highest capacity. The dust retention capacity of each type of leaf was calculated as- Dust retention capacity = W x 10^3 / A, where A is area of leaf in cm^2 and W is weight of dust retained in gm. For several decades, air pollution from cement industry has remained one of the most serious man made problems. Over 105 cement factories produce 500 lakh tones per annum and cause dust pollution in and around the factory area. In general, dust pollution by cement industry causes a variety of leaf injury ranging from excess water loss and impairment of photosynthesis by blocking the stomatal aperture. A study was conducted on cement dust retention capability of different species in and around a cement factory.

Keywords: dust retentivity, cement dust pollution

Introduction
For several decades, air pollution from cement industry has remained one of the most serios man made problems. Over 105 cement factories produce 500 lakh tones per annum and cause dust pollution in and around the factory area. The dust settles and accumulates on nearby land and vegetation. The impact of dust accumulation on soil and plants near the cement industries has been monitored by many investigators [1, 2, 3, 4]. In general, dust pollution by cement industry causes a variety of leaf injury ranging from excess water loss and impairment of photosynthesis by bloking the stomatal apearture. Vegetative response to dust pollution veries from species to due the plant morphology, Physiological and Bio-chemical chracterstics. As such, plants do not necessarily show similar retention pattern of dust pollutants. In view of this, a study was conducted on cement dust retention capability of different species in and around a cement factory located near District, Andhra Pradesh. The result of study are presented in this paper.

Methodology of work
Various species such as Terminalia, Neem, Eucalyptus, Hibiscus, Kasthuri, Guava and Mustred were selected for estimating dust retention capabilities of their leaves in and around the Cement Factory at distance ranging from 90 to 800m.Selected leaves of treas and plants were exposed to cement dust for different periods, i.e., 7, 14 and 30 days. Prior to exposure of these leaves, they were cleaned with a small jet of distilled water and dried with a hair dryer. Ten leaves were treated like this for each plant. Then all leaves were tagged suitably for identification. The leaves were left undisturbed for 7, 14 and 30 Days and collected in polythene packets. Sampling was carried out during dry period. On receipt in the laboratory, the leaves were transferred to tared beakers. 300 ml of double distilled water was added to the beakers and the contents shaken on a rotary (mini-type) shakers for 15 minutes. After shaking, the leaves were carefully removed and were spread out on blotting papers for drying. Area of dried leaves was determined by means of aplanimeter after tracing the outline. The beakers were kept for evaporation on a water bath, followed by drying at 103^0c for 1 hour. The dried beakers were then weighted after cooling. The dust concentration (Total solids) of liquied was determined according to Standard methods8.
The dust retention capacity of each type of leaf was calculated as:

$$\textbf{Dust retention capacity} = W \times 10^3 / A$$

A is area of leaf in cm^2 and W is weight of dustretained in grams.

Table 1: Dust Retentitvity of different plant species

Sample no	Name of Vegetative species		Distance from Stack(m)	Dust Retention Capacity (mg/cm^2)		
	Comman Name	Scientific Name		7 days Duration	14 days duration	30 days Duration
1A	Terminalia	Terminalia cattappa	212	3.08	-	20.31
2C	Neem	Azadirachta indica	800	27.55	756.5	1056.87
2E	Eucalyptus	Eucalyptus	125	19.15	35.52	53.07
2B	Hibiscus	Hibiscus rorasinenses	90	5.7	-	78.98
4B	Kasturi	Nerium Odorum	128	4.75	-	40.95
2D	Guava	Psidium guava	128	14.54	48.11	95.22
3B	Mustard	Ricinus corniunus	115	17.94	82.33	22.97

Results & Discussion

Dust retention capacity for various types trees and plants at different exposure periods is presented in Table. The results indicate that the Neem leaf was noted to have maximum retention capacity, being 27.55 mg/cm^2, 756.5mg/cm^2 and 1056.87 mg/cm^2 at 7, 14and 30days sampling period respectively. The least dust retention capacity was of Terminalia leaf. Such variation in retention capacity of dust by various plants leaves is not known. However, a literature review in this context indicates that dust accumulation on plant leaves is afuncction of surface characterdtics of leaves, electrolytic interaction between dust and the surface of plants species water content of outside cellular surface of leaf and over all plant morphological, physiological and biochemical characterstics of leaves [1, 2, 3, 4, 5, 6].

References

1. Agrwal SB, Agrwal M, Nandi PK. Impact of cement kiln emissions on vegetatation: An Ecolological assessment Indian J Env Hlth. 1988; 30(4):340-347.
2. Agrwal M, Agrwal SB. Phytomonitoring of air pollution around a thermal power plant Atmoshpheric Env. 1989; 23(4)763-769.
3. APHA. Standard Methods for Examination of water and waste water, 16th edn APHA, AWWA & WPCF, Washington D.C, 1985.
4. Brady NC. Advances in Agronomy, 27:89-118.
5. Mudd JB (Ed.) Effect of Air pollution on plants Acedmic Press, New York, 1975.
6. Sehmel CA. Particle and Gas Dry Deposition. A review. Atmospheric Env, 1980; 14:983-1011.